

REVIEWS

GENE EXPRESSION—2. Eucaryotic Chromosomes. Benjamin Lewin. First edition. John Wiley and Sons, London. Pp. 467 + 88 text figures, 35 plate figures. Cloth bound £8.00. Paper-back £3.95.

The book is broadly divided into two parts. The first part deals with the ultra structure and organisation of the genetic material in eucaryotes, the second with gene regulation and expression.

Chapter 1 deals with the structural organisation of the chromosomes, the composition of the chromatin fibres and details of the folded fibre model for eucaryotic chromosomes. The second chapter deals with the manifold activities and functions of the chromosomes during cell division. There is discussion of the various signals which initiate DNA synthesis and the synthesis of histones and of RNA. While many of the details concerning these events remain unknown there is a comprehensive and useful survey of the methods and approaches employed. The chapter continues with the organisation of the chromosomes at interphase, their movements during cell division and with the ultra structure and functions of centromere, spindle fibres and centrioles. Chapter 3 is devoted to the classification and analysis of the protein contents of the chromosomes, to the association of protein molecules with nuclear DNA in chromatin and to the structural implication of this association.

Chapter 4 deals with the "C value paradox" and the differentiation of the eucaryotic genome into repeated and non-repeated base sequences. The methods for distinguishing between repeated and non-repeated organisation of the eucaryotic DNA are based on the study of the kinetics of re-association of the dissociated DNA strands, isopycnic centrifugations on various analytical gradients, and on DNA \times DNA and DNA \times RNA hybridisation. These methods are described with a commendable clarity which will be much appreciated by those unfamiliar with this particular branch of molecular biology. There follows a summary of the sequence analysis of satellite DNA and speculation about the pattern of evolution of these highly repeated sequences. An account is given of the location and distribution of repeated sequences as revealed from *in-situ* hybridisation. The latter part of the chapter deals mainly with the organisation and significance of heterochromatin as revealed by giemsa banding and quinacrine fluorescence.

The second part of the book describes the problems concerned with the control of gene expression in eucaryotes. The complexity and sophistication of the control of gene expression in eucaryotes implies that the regulation of gene activity is far more complicated than that elucidated in bacteria and other prokaryotes. From the nucleic acid hybridisation studies it appears that the primary control of gene expression is exerted at the level of transcription. However, the mechanisms regulating the conservation of the messenger RNA sequences from the longer sequences initially transcribed are very poorly understood. It is also not clear whether all the messenger RNA sequences released to the cytoplasm are translated.

Chapter 5 describes the isolation and characterisation of the messenger

RNA sequences which specify the synthesis of globin proteins and histones and of individual messenger RNA sequences isolated from highly specialised cells like calf lens or silk glands of the silk worm. Particularly valuable is the section dealing with the processing of the messenger RNA sequences from larger molecules of Hn RNA and the organisation and transcription of the ribosomal genes.

Chapter 6 is concerned with the specificity of transcription in eucaryotic cells. There is an account of RNA synthesis associated with the puffing in polytene chromosomes and of transcription studies *in vitro* of isolated chromatin. The chapter concludes with an analysis of the model for gene regulation put forward by Britten and Davidson.

The last chapter is on the interaction between the nucleus and the cytoplasm and concentrates on the results of experiments on the transplantation of somatic nuclei and on the interspecific hybridisation of somatic cells. The usefulness of somatic hybridisation for mapping of chromosomes and determining the effects of foreign cytoplasm on chromosome function and behaviour is given proper emphasis.

On the whole this is an extremely readable book with excellent photographs and diagrams. Some of the results and conclusions discussed are rapidly being revised by the recent developments in this field. Nevertheless, the book is an important comprehensive survey of a most important subject and is strongly recommended.

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LE POLYMORPHISME DANS LE RÈGNE ANIMAL. Edited by M. Lamotte. Mémoires de la Société Zoologique de France No. 37, 1974. Pp. 568. Fr. 75.

The celebrated French population geneticist Georges Teissier having unfortunately died early in 1972, the Festschrift already being planned to mark his retirement had to be transformed into a memorial volume. Edited by Professor Maxime Lamotte, this was published in 1974 and comprises 15 substantial review articles (all in French, with English summaries) dealing with various aspects of genetic polymorphism in animals, which was one among many of Professor Teissier's research interests. Some of these are on topics already covered well enough in English elsewhere, but several of them will be of value to non-French biologists in giving up-to-date and critical articles on subjects not dealt with recently by reviewers in English. This is particularly so for polychromatism in marine invertebrates, about which there is a general review by Charles Bocquet, and two others, on the isopod *Sphaeroma* and on littorinid winkles, by R. Lejuez and C. F. Sacchi respectively. There are also comprehensive articles on butterflies by G. Bernardi and on birds by J. Dorst, and other organisms dealt with include *Drosophila* (E. Boesiger), ciliates (J. Générmont), the land-snail *Cepaea hortensis* (Marie-Anne Guerrucci), and Man (Charles Salmon). Then there are two articles concerned with chromosomal polymorphism, by J. Bergerard and P. Lécher; and three others of a more general nature, by E. Boesiger, M. Lamotte and J. Coursol, and Claudine Petit, on how polymorphism is established and maintained in natural populations. Finally, Georges Pasteur summarises what is known of the occurrence of heterozygosity in different groups throughout the animal kingdom, as estimated by protein electrophoresis.